

OPENING REMARKS BY THE MODERATOR

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OUR purpose this evening is to consider the diagnosis and treatment of temporal lobe epilepsy, with emphasis on the psychomotor type of seizure. This is an important subject for pediatricians as well as for psychiatrists and neurologists; for some patients with this syndrome, particularly children, are too often too long treated simply as behavioral disorders, or perhaps as cases of mental retardation. As we shall see, appropriate diagnosis, followed by suitable drug or surgical therapy, has much to offer, not only in reducing the frequency of seizures but in restoring such children or adults to a useful life.

Without further ado, I should like to call on our first speaker.

TEMPORAL LOBE EPILEPSY:
NEUROLOGICAL AND ELECTRICAL
ASPECTS *

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ALTHOUGH the association of severe personality disorder and psychomotor epilepsy is known to be exceedingly frequent,¹ little is known of the basis for this co-existence. Abnormal behavior can be the expression of abnormal discharging of brain cells^{2,3} and it is tempting to ascribe much of the abnormal personality to this. It is also reasonable to attribute

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TABLE I—ETIOLOGY OF SEIZURES

| | | | |
|--------------|---|---------|----|
| Tumor | 4 | Trauma | 2 |
| Infection | 3 | Angioma | 1 |
| Abscess | 2 | Unknown | 4 |
| Birth Injury | 2 | | — |
| | | Total | 18 |

the personality changes in temporal lobe epilepsy to the pathological changes within the temporal lobe itself.⁴ Abnormal psychodynamics are certainly also important. Ascribing the personality deviations to an "epileptic personality" presumably related to heredity, however,⁵ is contrary to most current data.

The major purpose of this study is to evaluate the interrelationships and assess the relative contributions to personality of the following: overt seizures, sub-clinical ictal phenomena, psychological and social factors, the reaction of the patient toward his illness, and the organic brain damage. A second purpose of the study is to define further the role of surgery in the management of patients with psychomotor seizures.

The psychiatric aspects will be covered by Dr. Shirley Ferguson. Dr. Lawrence S. Kubie was of inestimable help in setting up the methods and goals of the psychiatric study and Dr. Virginia Wilking has assisted greatly in this aspect of the work. We also wish to acknowledge the valuable assistance of Mr. Leonard Zablow, physicist of the EEG department.

This is a preliminary report of our experience with 21 patients with personality disorders who have been treated by lobectomy for intractable psychomotor seizures. Twenty were treated with temporal lobectomy and one had a frontal resection. All patients chosen showed the following, clinically: 1) significant personality difficulty; 2) intractable psychomotor seizures for more than three years; 3) no signs pointing to a space-occupying lesion at the time of being accepted into the study. After meeting these clinical criteria, EEG evidence of a spike or slow wave focus, located predominantly over one temporal lobe, was required on several EEG recordings.

The age range for the entire group at the time of the operation was 9 to 53 years; the average age was 27. Eighteen of the 21 patients have been followed for between eight months and three years, and evaluation of the results of the treatment is limited to that group.

Etiology

The etiology of the seizures by history and clinical findings is shown in Table I. Fourteen of the 18 had a clear history or findings related to etiology. Of the four listed as of unknown cause, two showed substantial atrophy on one side of the brain by pneumoencephalography. Thus, there was strong evidence of an organic basis for their seizures in 16 of the 18 cases.

X-Ray Studies

All 18 of the adequately followed group had contrast x-ray studies. Nine had abnormal studies. These included four patients with gross lesions (two tumors and two cysts), three with gliosis and two with no abnormal tissue on pathological study. Nine contrast studies were normal. These included two patients who had tumors, one with an angiomatous malformation, one with gliosis and five with normal tissue.

In all eight instances in which abnormalities in the contrast studies showed lateral accentuation, the operation was performed on that side. This occurred because patients were rejected for operation when contrast study abnormalities were present which did not complement the EEG and clinical findings.

Neurological and Psychological Findings

Only three patients showed significant neurological deficits. The four patients who proved to have expanding lesions showed no neurological defects prior to operation. Two patients who had had brain abscesses, 10 and 33 years previously, had optic atrophy and one of them had an homonymous field defect. Following a series of seizures, one patient had a transient hemiparesis which cleared completely before operation. No gross or microscopic evidence of brain pathology could be demonstrated in this case.

The Full Scale Wechsler Adult Intelligence Scale (W.A.I.S.) average was found to be unchanged after operation. Preoperatively, Verbal was 101.5 and Performance 89.5; postoperatively, Verbal was 101.2 and Performance 91.5. No significant change occurred in the mean score of the Bender Gestalt. The psychological aspects of the investigation, being carried out by Dr. Sidney Weinstein and Miss Linda Johnson,

largely concern perceptual and cognitive deficits. In order to evaluate the perceptual impairment, absolute sensory measures are obtained in all modalities; brightness, loudness, pressure, taste, and smell. Impairment of these primary capacities inevitably produce perceptual deficits, making necessary the evaluation of these sensory thresholds in the understanding of perception.

Impairment of complex perceptual and cognitive processes are being evaluated in various modalities with EEG monitoring. Comparisons of perceptual behavior during such periods with EEG recording permits an examination of the hypothesis that some aspects of change in the EEG activity correlate with impairment of perception and cognition.

EEG, ECG, and Activation Studies

Pre-operative scalp EEGs without special activation technics showed unilateral temporal foci or suggestive unilateral temporal foci in 15 of the 21 patients, and were abnormal in the remainder. Of the 18 patients with more than eight months of postoperative follow-up, scalp EEGs were focal temporal or suggestively focal temporal in 14. Contralateral EEG abnormalities of some degree were found in most patients.

Clinical seizures were activated by Metrazol in most patients. Metrazol was administered intravenously at the rate of 1 mg. per kg. each 30 seconds⁶ until evidence of clear-cut EEG changes or aura occurred, and then at the rate of 1 mg. per kg. each minute until 15 to 20 mg. per kg. had been given or a seizure occurred. Following the activation, 100 to 200 mg. of sodium phenobarbital was given intravenously. Characteristic aura or seizures were activated in 14 of 16 patients. Motor phenomena of the extremities, when lateralized, were usually appropriate. The direction of head and eye turning, however, was not often helpful in lateralization. In instances when more than one activation was done on the same patient, there was a consistency of the clinical features. Metrazol activation of the EEG confirmed the lateralization, or demonstrated the abnormal side in 14 of 16 instances and was misleading once. Post-ictally, focal slow waves were sometimes encountered in the opposite temporal lobes and were considered a misleading sign.

CASE REPORT: This is a 22-year old female who had her first generalized seizure at the age of 9 years while convalescing from a siege of measles, mumps and whooping cough. At the age of 14 years the pattern changed to a sensation of "closing of the left ear", numbness of the left side of the face and

seeing circles out of the left corner of the eye followed by unconsciousness and falling with generalized tonic and clonic movements. By the age of 18, the generalized major components had become infrequent and the attacks consisted of: 1) "scary feelings" or a sense of "floating", or rarely the feeling of "closing of the ear", or of hearing of a distant sound; 2) forced ideas intruding from outside her normal stream of thought; and 3) automatisms. Once while in a theatre she noticed her legs were cold. A companion told her that she had removed her stockings and put them in her purse. At 14 years of age she attempted suicide as a part of a reactive depression. At 16 years she was placed in a mental hospital for a toxic psychosis with a paranoid reaction apparently precipitated by anticonvulsant treatment with primidone. In spite of treatment with large amounts of many medications she continued to have two to five attacks daily until the time of operation.

Recordings showed that her resting EEG was practically unchanged during the time she was experiencing her aura (Figures 1a, b) and that marked paroxysmal activity occurred at the surface of the cortex which did not appear at the scalp (Figure 1c). The records also indicated that evidence of barely perceptible clinical and of subclinical interference with perception and thought processes may appear in electrical activity from the cortex and depths of the brain without being manifest in scalp recording (Figure 1d). She was operated upon on January 7, 1960. Since discharge from the hospital, she has been seizure-free, has made a good social adjustment and is working full time.

In our experience, Metrazol activated inter-ictal focal abnormalities and reproduced spontaneously occurring attacks in the great majority of cases. Usually, no marked change in the EEG occurred during the aura (Figures 1a and b). There were a variety of EEG patterns during the psychomotor seizures. Automatisms occurred both during and after the electrical evidence of seizure activity.

At operation, spike discharges were seen in the electrocorticogram, and/or depth recordings in 17 of the 18 operated patients followed for more than eight months. Only two of the 17 patients showed complete disappearance of spike discharges immediately following the resection. Obviously, the presence of spiking at the cortex directly after resection had no correlation with prognosis. Perhaps Dr. Strobos or Dr. Purpura will comment on the meaning of this persistence of abnormality.

The follow-up scalp EEGs, on the other hand, correlated well with seizure control. All 11 patients whose EEGs were better eight months or more after operation showed more than 75 per cent improvement in seizure control. Five of six patients whose records were the same or worse than pre-operatively were in the less than 75 per cent improved categories.

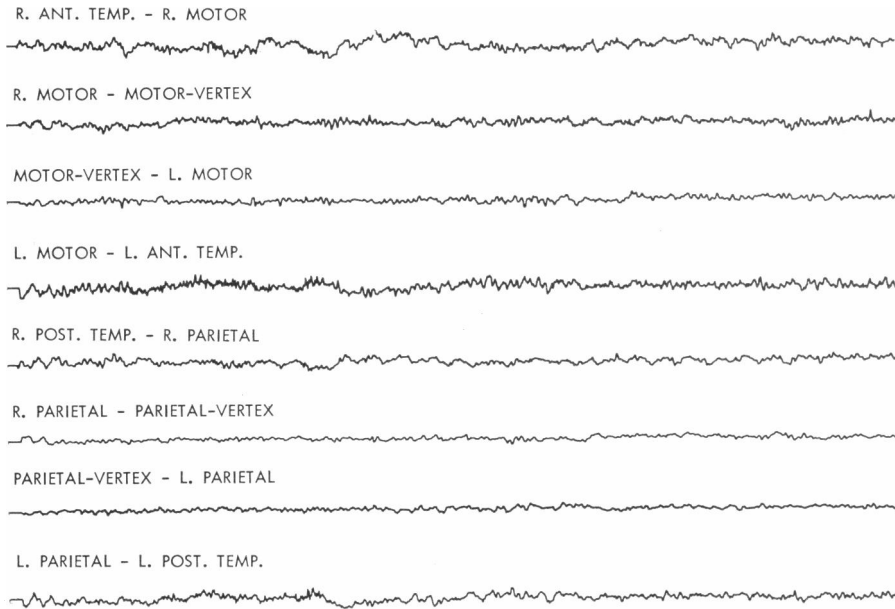


Fig. 1(a)

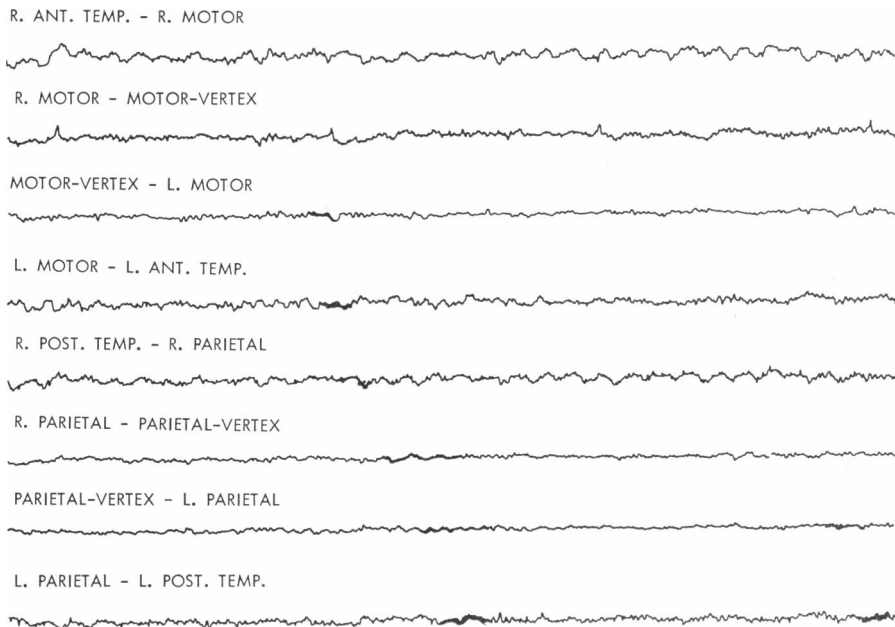


Fig. 1(b)

Fig. 1. (a) Resting record shows mild right anterior temporal slowing. (b) Activation by Metrazol. The usual aura is occurring without marked EEG changes. (c) Electroocorticrogram shows high voltage spikes which were not apparent in the EEG. Electrodes 1, 2, 3 and 4 are subcortical with electrode 1 four cm. deep in the vicinity of the amygdala. Electrodes 11, 12, 13, 14, 17, and 18 are on the surface. (d) Electroocorticrogram and depth recording with marked increase in spiking at the cortex and from the region of the amygdala during a period of depressed responsiveness to verbal stimuli. Electrode placement is the same as in 1(c).

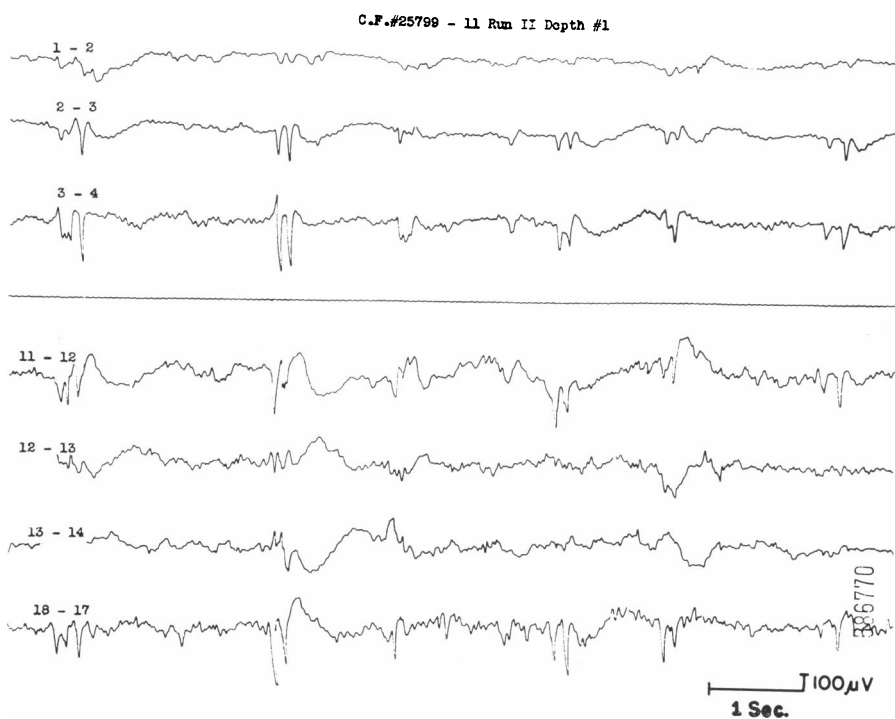


Fig. 1(c)

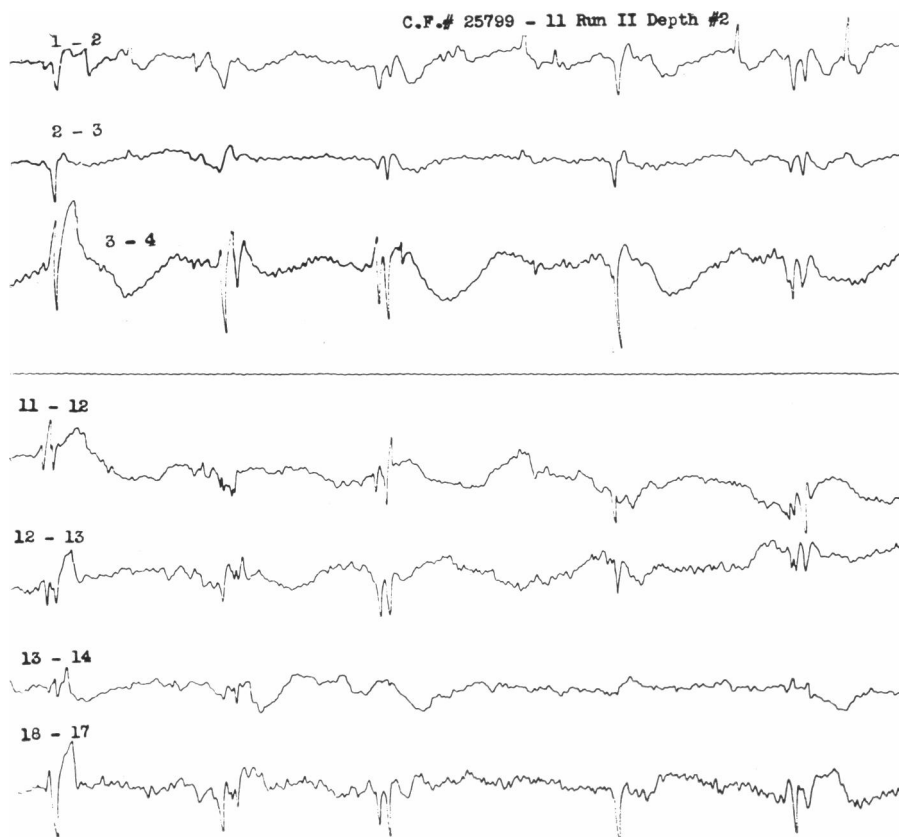


Fig. 1(d)

TABLE II—EFFECT OF OPERATION ON CONTROL OF SEIZURES
(Eighteen Cases—eight-month to three-year follow-up)

| | | <i>Cases</i> | <i>Per Cent</i> |
|-------------------|---|--------------|-----------------|
| <i>Success</i> | | | |
| Complete control | 5 | | |
| > 75% Improvement | 7 | 12 | 67 |
| <i>Worthwhile</i> | | | |
| > 50% Improvement | | 3 | 17 |
| <i>Failure</i> | | | |
| < 50% Improvement | | 3 | 17 |

TABLE III—PATIENTS AT WORK OR IN SCHOOL
(Eighteen Cases)

| | <i>Before Operation</i> | <i>After Operation</i> |
|--------|-------------------------|------------------------|
| School | 1 | 3 |
| Work | 3 | 7 |
| | — | — |
| Total | 4 | 10 |

Results of Treatment

The effects of lobectomy upon seizures in 18 cases with an eight-month to three-year follow-up were classified according to the method of Penfield and Steelman⁷ and showed 12 of the 18 cases in the "successful category", i.e., completely controlled or with greater than 75 per cent improvement in seizures (Table II). Dr. Ransohoff will discuss the surgical aspects of the study.

There was no apparent relationship between the characteristics of the preoperative seizures or aura to the outcome. Most patients had generalized major attacks at some time in their course. Eight were suffering from generalized convulsions or falling attacks in addition to psychomotor seizures at the time they entered this study. Of these eight, five had no recurrence of the generalized major or falling attacks following operation, and of the remaining three, two have been free of such attacks during the past nine months. Thus, one of our fears, that the presence of falling or generalized major attacks might adversely affect the outcome, was not borne out. It must, however, be added that the preoperative generalized attacks, although often disabling, were infre-

TABLE IV—RELATIONSHIP OF PATHOLOGY TO CONTROL OF SEIZURES
(Eighteen Cases)

| | Success | Less Than 75% Improvement |
|-------------------------------|---------|------------------------------|
| <i>Mass Lesions (7)</i> | 6 (85%) | 1 |
| Tumors 4, Cysts 2, Angioma 1 | | |
| <i>Normal or Gliosis (11)</i> | 6 (55%) | 5 |
| Gliosis (4) | 3 | 1 |
| Normal (7) | 3 | 4 |
| | 12 | 6 |

quent. The ability to attend school or to work for wages is one aspect of over-all improvement. Table III indicates the gains in this regard. Dr. Ferguson will deal with other aspects of the complex problem of obtaining meaningful indices of improvement.

The relationship of pathological findings to results is given in Table IV. Our findings suggest that patients with mass lesions do better, as a group, than those with gliosis and those who show only normal tissue.

In summary, we are attempting to investigate the nature of the relationship between temporal lobe seizures and associated disorders in personality and behavior. Our experiences so far have supplied us with glimmerings of how to continue to pursue this difficult problem. We have also been attempting to add to the clinical understanding of the nature and meaning of local and projected epileptic discharges, while offering indicated surgical treatment for patients with temporal lobe epilepsy and assessing the results.

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